Eastern Connecticut Corridor Rail and Transit Feasibility Study (ECRTS)

Preliminary Feasibility Assessment
Executive Summary

Interim Report

March 2023

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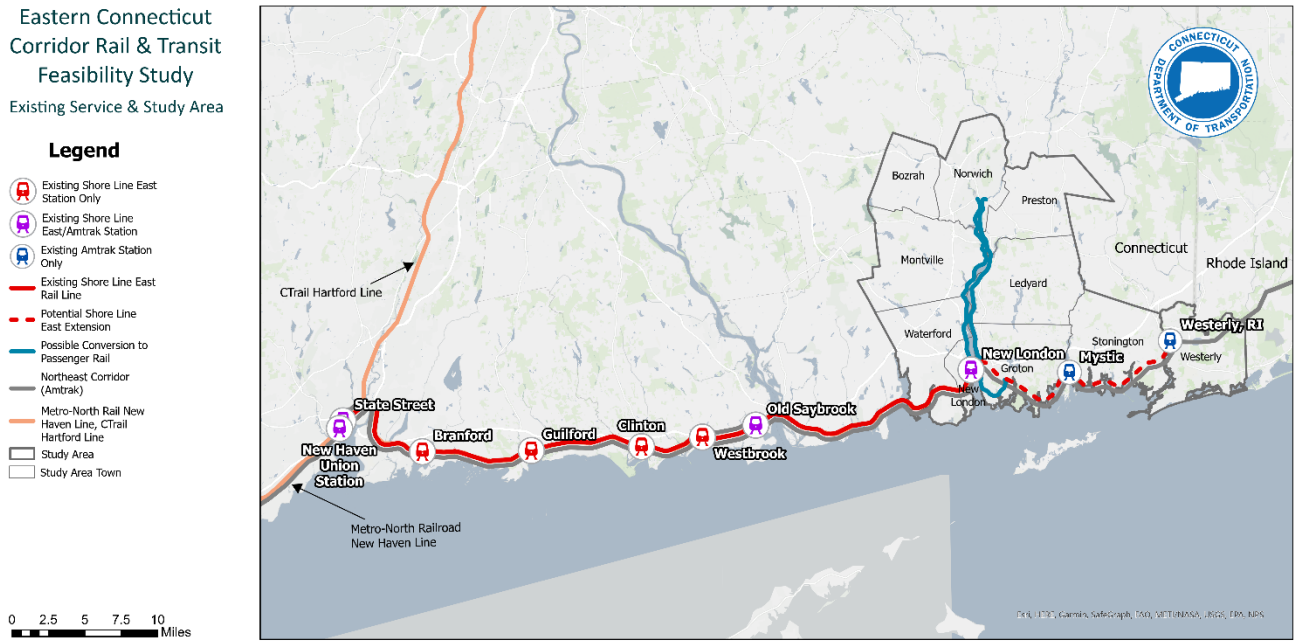
1. Study Introduction and Background

The Connecticut Legislature directed the Connecticut Department of Transportation (CTDOT) to conduct a feasibility study for expanding passenger rail service and ground transportation options in southeast Connecticut[1]. This effort, referred to as the Eastern Connecticut Corridor Rail and Transit Feasibility Study (ECRTS) is investigating the feasibility of and market for the following transportation improvements (Figure 1):

- Extending the Shore Line East rail line to the State of Rhode Island
- Establishing a new passenger rail service from the City of New London to the City of Norwich
- Establishing a new passenger train station in the Town of Groton and the Borough of Stonington
- Extending other ground transportation systems in the eastern region of the state and providing improved connectivity between such systems and rail lines

Figure 1. Study Area Regional Context



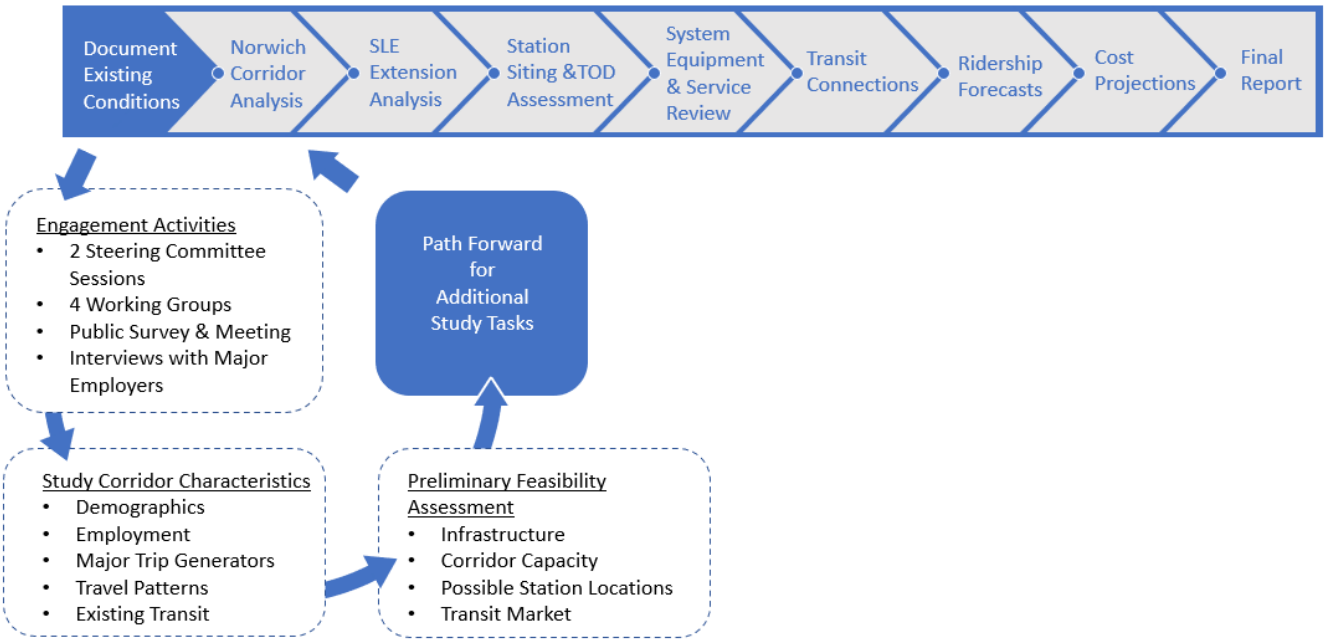
A feasibility study is the first step in evaluating the viability of service in a corridor. The study will consider existing and future economic market/environmental conditions, equity and environmental justice issues, preliminary engineering, current and projected ridership levels, service operations, equipment needs, system requirements, and preliminary cost estimates (Figure 2). As a result of the findings of these investigations, more detailed studies may follow.

This report summarizes the analysis and findings of seven detailed technical reports, which are presented separately as appendices to this document. *The appendices detail the sources of data used for the analyses*

[1] Substitute House Bill No. 6484, Public Act 21-175, Section 20

conducted as part of this Preliminary Feasibility Assessment. All sources of data and information are cited in the appendices.

Figure 2. Study Timeline

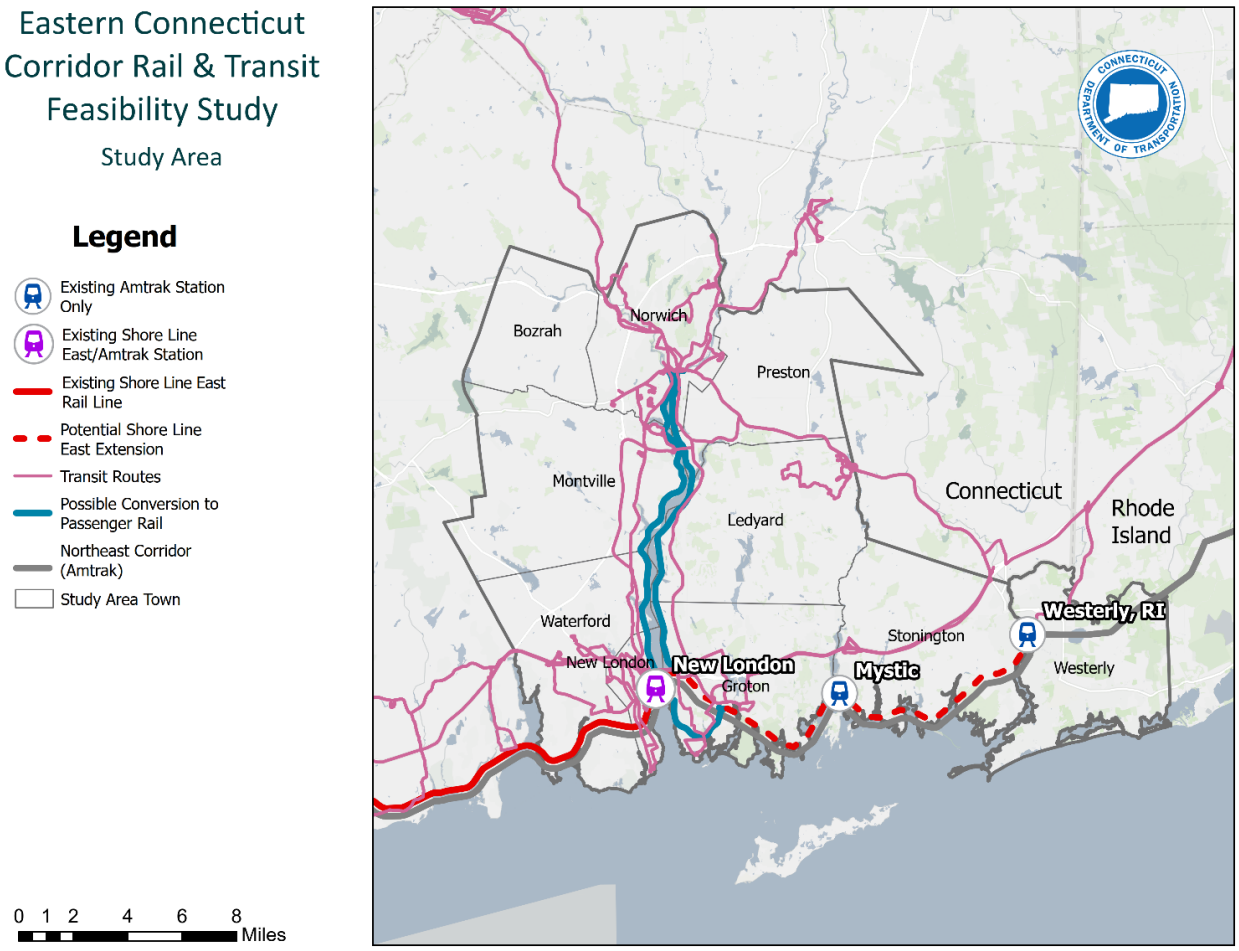


2. Study Corridor Characteristics

The study area is in the southeast corner of Connecticut on the coast of the Long Island Sound, with Rhode Island immediately to the east. It is defined as the ten municipalities through which the proposed rail service passes, which includes Bozrah, Groton, Ledyard, Montville, New London, Norwich, Preston, Stonington, and Waterford in Connecticut, and Westerly, Rhode Island. The study corridors considered in this preliminary feasibility assessment include those along both sides of the Thames River from New London to Norwich, as well as the corridor extending from New London, CT to Westerly, RI[2] via the shoreline communities (Figure 3). The existing conditions and current and future needs relating to mobility along these study corridors are laid out in this section, drawing from data findings detailed in the **Existing Conditions Report (Appendix A)**.

[2] The terminal location in the State of Rhode Island was discussed between the Connecticut Department of Transportation and the Rhode Island Department of Transportation (RIDOT). RIDOT expressed the preference to terminate the study corridor at the existing Westerly (Amtrak) Station.

Figure 3. Study Area Local Context



Regional Patterns

The study area is characterized by a mix of urban, suburban, and rural communities, with 51% of the study area's total population residing in Norwich, Groton, and New London; Bozrah and Preston have the lowest population count. Overall, areas along the coast and the Thames River have greater population densities than the inland areas. Demographic characteristics vary significantly between the communities – the cities are more ethnically diverse, particularly in New London and Norwich, while the other municipalities in the study area have either similar or significantly lower non-white population rates than the state of Connecticut. These urban areas, along with Groton, are also characterized by younger populations due in part to the greater presence of educational institutions, as well as by lower household income rates and higher poverty levels relative to the surrounding towns.

The Environmental Protection Agency (EPA) has identified Environmental Justice (low income and minority) census block groups based on a combination of demographic indicators – race and ethnicity, income level, unemployment, etc. – and environmental indicators. This screening process helps in understanding the specific areas and communities that are most vulnerable to changes related to climate change, economic opportunity, transportation investment, among other factors. New London, areas of Norwich closer to the Thames River, and three census blocks within Groton contain the greatest proportion of communities exhibiting high levels of such vulnerability to change. Since 2010, Connecticut's own developed "Distressed Municipalities" designation has

identified the 25 towns with highest composite scores including unemployment rates, job decline, and per capita incomes. New London, Norwich, Groton, Montville, and Preston have all been listed, with Norwich ranked as the second most distressed municipality in the state in 2021; New London was the fourth, Montville number 10, and Groton number 19. Identifying these more vulnerable communities provides an indication of areas that could benefit from certain development efforts and growth opportunities.

Regional Demographics

- ***51% of study area population is in Norwich, Groton, and New London***
- ***Bozrah and Preston have the lowest population***
- ***Urban areas are younger and more ethnically diverse, with higher poverty levels***
- ***2021 "Distressed Municipalities": New London, Montville, Norwich and Groton***

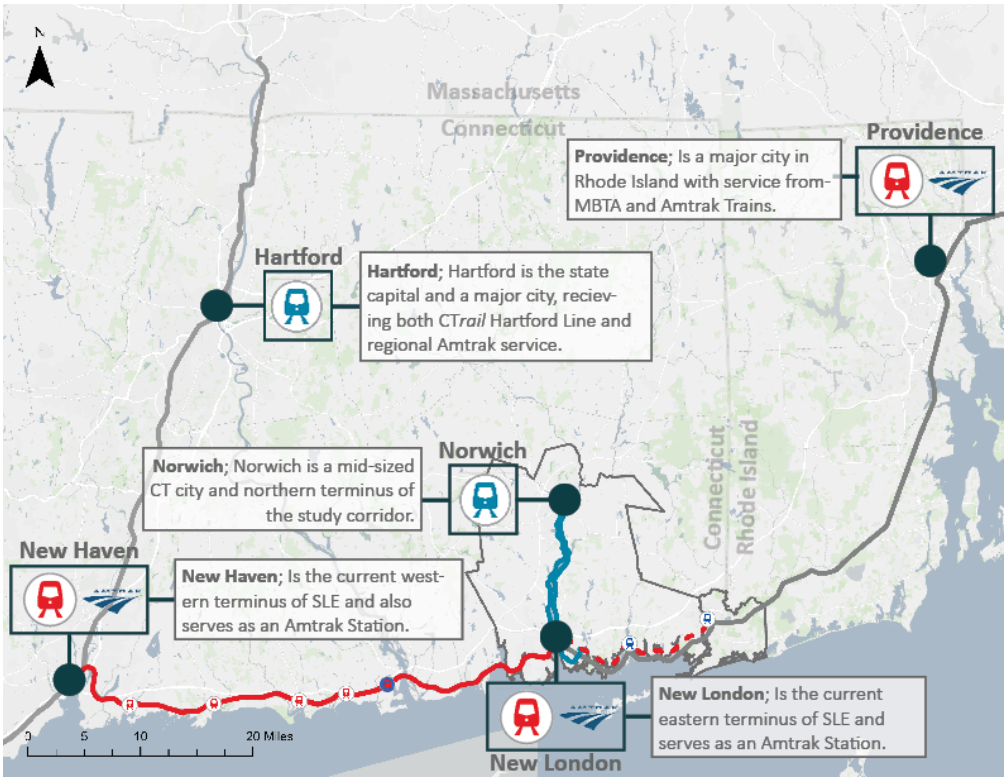
The number of jobs in the region has declined over the last fifteen years, dropping 5.7 percent between 2008 and 2020 (pre-pandemic) compared to the state's 0.7 percent overall decline rate. Additionally, while most of the study area towns' unemployment rates hover around the state's 5.8 percent rate, the average unemployment rate for the study region is higher than that of the state – Norwich and New London have the highest rates and exceed the average by 1.8 and 3 percent, respectively. The population has also seen a steady decline across all study area communities between 2010 and 2019, averaging a growth rate of -2.5%. In the context of the state, Connecticut's overall population remained virtually stagnant during that period. Looking forward, growth in the manufacturing and defense industries are projected to bring thousands of new jobs to the region in the coming decade.

Regional Travel Patterns

- ***Regional rail connectivity from Boston to New York via the NEC (Amtrak, Metro North Railroad, MBTA)***
- ***Commuter rail service in CT from New Haven to New London (SLE)***

Passenger rail service in the Southeast Connecticut region is integrated into the Northeast Corridor (NEC), which connects Boston and New York via Rhode Island and Connecticut. The Shore Line East (SLE) commuter rail service operates on the NEC in Connecticut, supplementing Amtrak service to serve commuters between New Haven and New London (Figure 4). In the context of greater regional connectivity, the study area is approximately an hour's drive from Providence and New Haven, 50 minutes from Hartford, two hours from Boston, and two and a half hours from New York. Reaching these regional destinations by rail is also possible via the NEC with service operated by Amtrak between New Haven and Providence, Metro North Railroad west of New Haven, and the Massachusetts Bay Transportation Authority (MBTA) east of Providence.

Figure 4. Regional Major Cities and Transit Access



A key part of this Preliminary Feasibility Assessment is the **Transit-Oriented Development (TOD) Corridor Scan (Appendix B)**. The TOD Corridor Scan was conducted to provide an initial analysis of existing economic conditions specific to the study area surrounding the two proposed rail line extensions: along the Thames River Corridor and the SLE extension, identifying the market for improved transit access. It also served to evaluate initial opportunities and considerations for TOD and highlighted potential economic impacts of different alignment choices, such as for the east versus west sides of the Thames River. The TOD Corridor Scan revealed relatively low population and job densities along the corridors, but densely populated urban cores in New London, Norwich, and Groton that would be more likely to support transit ridership and sustain TOD[3]. Supportive land use policies, including zoning that promotes density, and local infrastructure investments will be critical to connecting the current populations to the rail stations, encouraging higher density development, and subsequently building the market for TOD.

Previous studies have been conducted examining Shore Line East services, services that interface with SLE and regional transit services, in addition to relevant bus service networks – the studies are detailed in the **Previous Report Review (Appendix C)**. This review also includes key findings from Plans of Conservation and Development (POCD) developed by each of the municipalities in the study area and by Southeast Connecticut Council of Governments (SCCOG), as well as findings from other relevant municipal plans and studies targeting mobility improvements. POCD documents provide an overview of existing conditions with regards to land use, development, transportation, and infrastructure followed by a vision for future key projects, goals, and community priorities, which are useful for understanding the conditions, needs, and goals on a more local scale.

[3] The industry guideline is a minimum density of 15-30 combined people and jobs per acre to support frequent and cost-effective rail service. Source: Robert Cervero and Erick Guerra, Urban Densities and Transit: A Multi-Dimensional Perspective, 2011; Translink, Transit-Oriented Communities: A Literature Review on the Relationship between Built Environment and Transit Ridership, 2010.

Key findings from these studies include:

- TIME FOR CT is the actionable rail vision addressing service and infrastructure improvements throughout the state of Connecticut, with an emphasis on improving trip times by 2035.
- Connect NEC 2035 is a collaborative reinvestment program addressing state of good repair backlog and improved service and travel-time goals.
- Southeast Area Transit District (SEAT) Bus Study, SCCOG Long-Range Metropolitan Transportation Plan, and SCCOG POCD set the goal of express bus service or light Bus Rapid Transit from New London to Norwich to improve inter-regional connectivity.
- Transit service reliability and efficiency, improvements to system and fare connectivity between rail and bus networks, and improvements to address gaps in transportation are needed.
- Strategies encouraging complete streets and coordinated accessible transportation should be promoted, particularly in ways that meet the needs of the region and its communities.

Northeast Corridor

The Northeast Corridor (NEC) links Washington D.C. to New York and continues to Boston via Connecticut and Rhode Island. It is the most heavily used rail corridor in the U.S. The focus area on the NEC for this assessment is the SLE extension from New London, CT to Westerly, RI that travels through Groton and Stonington.

Demographic and Employment Characteristics

Along this section of the corridor, the areas with the highest population and employment densities are around the urban cores of New London, Groton, and Westerly. Stonington represents the least densely populated portion of the corridor and has the lowest employment density of the four towns. Additionally, along with Westerly, it is the least ethnically diverse area. Relative to the rest of the towns in the study area, the western portion of the possible SLE extension in New London and Groton have the youngest populations, while Stonington and Westerly have the oldest populations. The majority of the rail-abutting census tracts have a high proportion of residents renting their homes, although over 4,500 of these renters are cost-burdened, paying 30% or more of their income on rent. New London, eastern Groton, and downtown Westerly are home to most of the cost-burdened renters.

There are three major employers proximate to the possible SLE extension: Lawrence Memorial Hospital in New London and Electric Boat Corporation and Pfizer in Groton, which are the first, third, and fourth largest employers in the study area, respectively. The total number of employees at these locations amounts to over 25,000 as of 2021. Despite the absence of major employers of this scale along the corridor east of Groton, Stonington and Westerly have the lowest unemployment rates. However, average wages in these towns remain lower than the regional average, and significantly lower than the state average. Unemployment rates in Groton are higher than the state average of 5.8%, but the average wage is significantly higher. New London has an average wage comparable to the regional average, but nearly double the state average of unemployment.

Major Trip Generators and Travel Patterns

Travel patterns reveal several major activity centers for residents, employees, students, and visitors in the areas surrounding the SLE extension (Table 1). The major activity centers are listed down the first column of the table, and

Major Employers and Trip Generators
1. Lawrence Memorial Hospital (New London)
2. Electric Boat Corporation (Groton)
3. Pfizer (Groton)

the primary trip origin locations are listed across the top row. Some study area residents commute to end points within their own municipality, while others travel to further destinations. Groton and New London produce the most average daily origin trips ending at three major employment destinations – Pfizer, Electric Boat Corporation, and Groton Submarine Base – and traffic in Stonington, New London, and Westerly originates within each respective municipality. Generally, Stonington and Groton produce the highest levels of activity center traffic.

Table 1. Trip Production to Major Activity Centers Along Possible SLE Extension

	New London	Groton	Stonington	Westerly
Pfizer, Electric Boat, and US Navy Submarine Base (Groton)	X	X		
Stonington		X	X	X
The Village of Mystic	X	X	X	X
Westerly			X	X
New London Center	X	X		

Most residents in each of these four municipalities commute to work via a single-occupant vehicle (SOV), which aligns with the state's primary recorded means of transportation to work. The modal split within each municipality breaks down the proportions of transportation modes used to travel (Table 2). Please note that these numbers are reflective of pre-pandemic (2019) travel patterns. Travel patterns and commute modes have shifted coming out of the pandemic, especially with the expansion of work-from-home (remote or hybrid) work schedules. Because of the shift in commuting modes and travel patterns, the 2019 data was supplemented with third party commute data from StreetLight and interviews with major employers and anchor institutions in the study area.

Table 2. Pre-Pandemic (2019) Work Commute Modal Split Along SLE Extension

	New London	Groton	Stonington	Westerly
SOV	75.6%	79%	79.1%	80.3%
Carpool	11.2%	7.7%	5.9%	7.7%
Public Transit	5.2%	1.9%	1.8%	2.1%
Walk	4%	3.5%	1.6%	2.9%
Other	1.6%	2.2%	1.1%	1.8%
Remote	2.4%	5.9%	10.4%	5.2%

Along this corridor between downtown Groton and Westerly, the combined population and job density remains low, mostly between two and three persons and jobs per acre – with a segment in Stonington revealing between zero and one person and jobs per acre. Approaching western Groton, the density increases to an average of four to five people and jobs per acre. The urban cores of Groton (one census tract) and New London (three census tracts) are the only areas along the extension that currently meet the industry guideline[4] minimum density of 15-30 combined people and jobs per acre estimated to support frequent and cost-effective rail service. Despite these conditions, investment in the SLE extension could help attract higher-density development and subsequently support further TOD.

[4] Robert Cervero and Erick Guerra, Urban Densities and Transit: A Multi-Dimensional Perspective, 2011; Translink, Transit-Oriented Communities: A Literature Review on the Relationship between Built Environment and Transit Ridership, 2010.

Existing Transit Services

Northeast Corridor Transit and Rail Services

- ***Current Amtrak regional and Acela passenger rail service***
- ***Shore Line East commuter rail operations from points west into New London***
- ***SEAT (CT) and RIPTA (RI) local bus operations***
- ***Intercity Greyhound bus operations***
- ***Limited casino bus contracts***
- ***Ferry services***

Within the NEC study area limits, Amtrak operates the current two-track rail connecting the New London, Mystic, and Westerly stations. This regional service provides 19 daily round trips[5] between the New Haven and the Rhode Island State Line segment of the NEC, and it runs to Boston, New York, and south of New York. Connecticut's SLE route is also operated by Amtrak and provides commuter service with 23 trains daily between New London and New Haven. Connecting services at New Haven include service on the Hartford Line north to Hartford and Springfield, Massachusetts, as well as on the New Haven Line west to Bridgeport, Stamford and Grand Central Terminal in New York.

Southeast Area Transit District (SEAT) operates fixed route transit and demand response services Monday through Saturday in communities abutting the NEC – except for Route 3 and the Stonington HOP demand response service operating between Pawcatuck and Mystic that operate Monday through Friday (Figure 5). SEAT routes generally operate from 6 AM to 7 PM with late-night service through 11 PM on five routes. Complementary ADA paratransit service is available to pre-approved customers at the same times and locations via SEAT Connect. Rhode Island Public Transit Authority (RIPTA) serves Westerly on weekdays only with a route connecting Westerly to Providence during peak hours, a deviated fixed route operating on Fridays between Westerly and Hope Valley, and a demand response service known as Westerly Flex operating within a 7-mile radius of Westerly's downtown. There is no bus service running along the NEC connecting New London and Westerly.

Figure 5. SEAT Fixed Route Bus Routes along NEC

Intercity bus service is operated by Greyhound and connects New York to Boston once a day in each direction, stopping at New London Union Station on the way. Northbound service operates Friday through Tuesday and southbound service operates Thursday to Monday. Mohegan Sun contracted bus services, which stop in New London, are almost entirely discontinued, and ridership has steeply declined since 2019. As of 2021, there is limited service through only two contracts. With regards to ridesharing and vanpools, some commuters utilize

[5] Please note that some trips are cross-branded as Amtrak regional and Shore Line East services.

these services to reach work destinations, with several destinations located in the New London and Groton areas. Finally, ferry service operates out of the New London Terminal and provides transportation to and from Fishers Island, Block Island, as well as Montauk and Orient Point on Long Island. A seasonal water taxi connects New London and Groton.

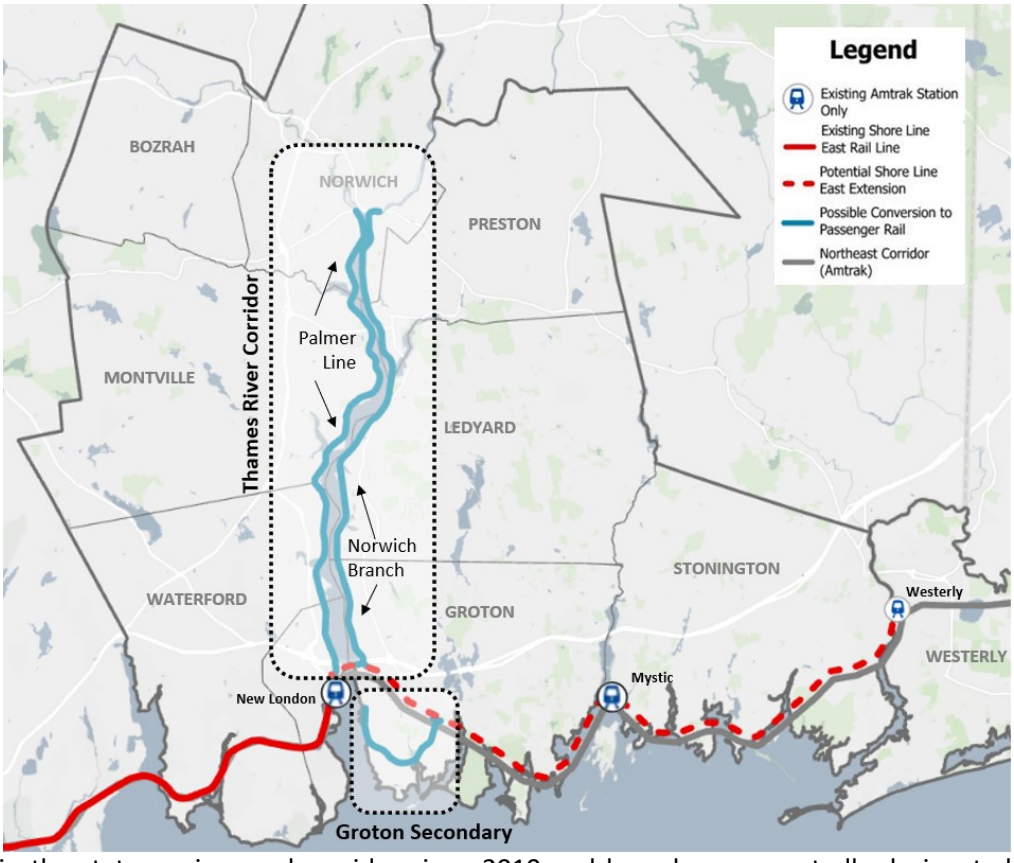
Thames River Corridor

The Thames River is a 15-mile tidal estuary spanning from downtown Norwich to New London, where it drains into the Long Island Sound. Two existing freight rail corridors run adjacent to the river on each side (**Error! R eference source not found.**). On the western banks of the Thames, the Palmer Line extends through Connecticut into Palmer, MA, passing through New London, Waterford, Montville, and Norwich, adjacent to Bozrah. To the east of the Thames, the Norwich Branch travels from New London to Worcester, MA, passing through Groton, Ledyard, Preston, and Norwich. Both rail corridors are owned by Genesee and Wyoming Inc. (GWI) and operate limited freight service, with frequency between once and twice per day.

Demographic and Employment Characteristics

Municipalities in the Thames River Corridor can be grouped into three subsets with similar demographic trends: towns with higher densities, towns with lower densities, and Montville.

Figure 6. Map of Thames River Corridor & Groton Secondary



New London, Groton, and Norwich are people- and job-dense municipalities, home to large companies that provide high wage jobs. Some of these workers commute in from neighboring, lower density towns, where rent and home values are higher; others both live and work in these municipalities, where rent and home values are lower. However, residents of New London, Groton, and Norwich earn lower incomes and experience more poverty than the lower density commuter towns. The populations of these municipalities have declined more precipitously than others in the state, region, and corridor since 2010 and have been repeatedly designated "Distressed Municipalities."

In contrast, the less dense towns of Waterford, Bozrah, Preston, and Ledyard are populated by commuters who tend to be older, white and earn a higher income, experiencing less poverty than the statewide average. In

comparison, these towns have fewer jobs that pay less than those in the more urban areas of the Thames River Corridor. While these towns have also experienced population loss greater than the statewide average, it is lower than New London, Groton, and Norwich.

Montville is home to the Mohegan Sun Casino and Resort and deviates slightly from the composition of its fellow sparsely populated neighbors, maintaining a younger and more ethnically diverse residential base. Average wages for the jobs in Montville are the second lowest in the region and 60% of the statewide average (2019). In addition, the town has experienced the highest rate of population loss in the study area – 3.8% between 2010 and 2019. This is largely tied to the decline of the gaming industry, which has been impacted by overall economic malaise and increased competition in New England, resulting in 12,000 gaming-related jobs lost between 2008 and 2015 in the study area.

Major Trip Generators and Travel Patterns

Large employers are spread throughout the corridor, dictating employment and commute patterns. On the west side of the Thames River, the Lawrence Memorial Hospital in New London, Mohegan Sun in Montville, and the William W Backus Hospital in Norwich employ over 21,000 workers. The employees traveling to Mohegan Sun alone account for 17.3% of the study area's daily commute traffic; of these commuters, 33% live in Montville, while 15% live in Norwich, and the remainder travel from other municipalities.

Major Employers & Trip Generators
1. ***Mohegan Sun (Montville)***
2. ***Navy Submarine Base (Groton)***
3. ***Pfizer & Electric Boat (Groton)***

On the east side of the Thames River, Foxwoods Casino in Ledyard and Groton Submarine Base, Electric Boat, and Pfizer in Groton employ more than 25,000 workers. Workers driving into these three major Groton employers account for 19.2% of the study area's commute traffic, while Foxwoods Casino alone accounts for 15.3% of daily study area traffic.

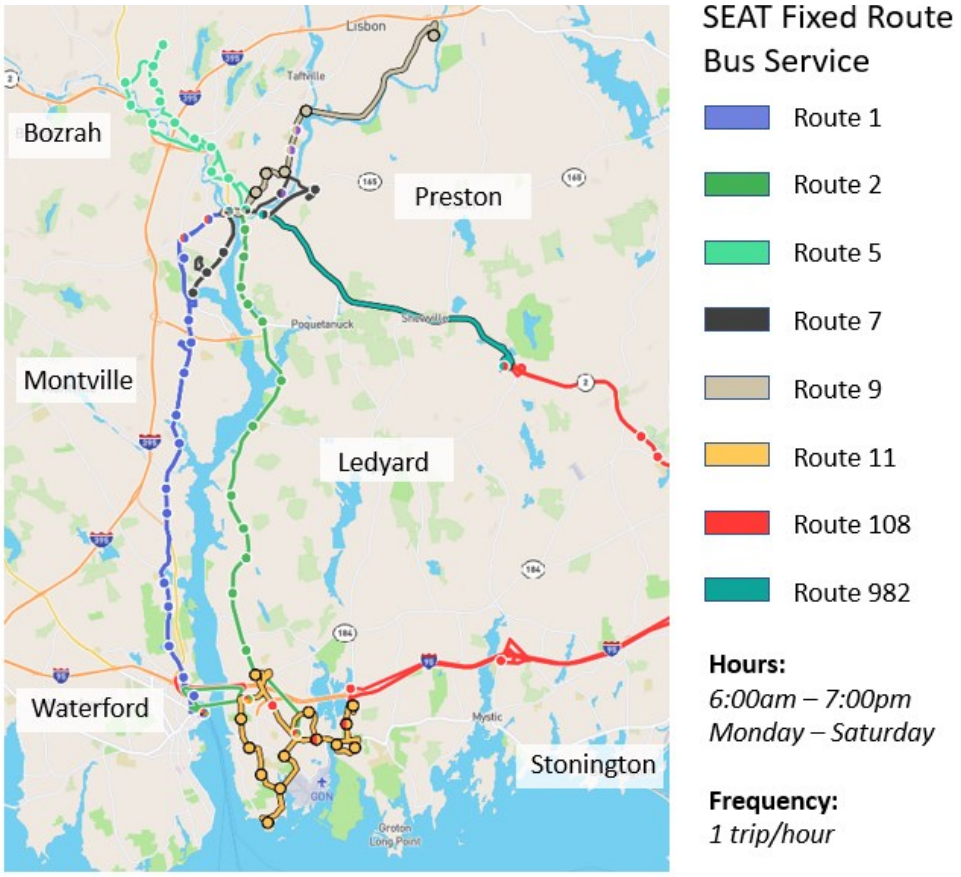
High proportions of workers commute into activity centers from neighboring municipalities, but because of the infrequent public transit service, relative ease, speed, and convenience of driving a private vehicle, and dispersed housing locations, among other reasons, residents of these towns are more likely to drive alone to work than the statewide average. New London, which is the densest city in the study area and served by rail and bus service at New London Station, is an exception; the city boasts a modal split that is 6% higher across carpooling, public transit and walking to work than Connecticut as a whole.

Existing Transit Services

SEAT operates the majority of the transit services along the Thames River Corridor. Routes 1 and 2 travel down the west and east banks of the Thames, connecting New London with Norwich and Norwich with Groton, respectively. Intracity routes also serve New London, Groton, and Norwich town centers. SEAT also connects Norwich with other nodes throughout the Corridor, including the Mohegan Sun and Foxwoods Casinos.

Additional transit operations in the area include the Windham Region Transit District's 7-days-a-week Norwich to Foxwood Casino service, the Mohegan Sun line, the Mashantucket Pequot Tribal Transportation community route, New London Smart Ride (an on-demand micro transit service for trips that begin and end within New London), and on-demand service for seniors in each of the Corridor towns.

Figure 7. SEAT Fixed Route Bus Service Along Thames River Corridor



Groton Secondary

The Groton Secondary is a 2.86-mile-long freight rail line spur that connects the Electric Boat campus to the NEC between Poquonnock and South Roads in Groton (**Error! Reference source not found.**, page 9).

Demographic and Employment Characteristics

Groton is a hub of activity within the region. Though the town has experienced the greatest loss of total residents over the past decade, Groton remains the second most populous and third densest town in the study area (ACS 2019). Groton has the second highest job density in the study area, behind New London, with approximately 2.5 times more density than the study area and statewide average. This is due to the presence of the US Navy Submarine Base, Electric Boat Corporation, and Pfizer, which employ 10,000+, 8,000+, and 5,000+ workers respectively. Unemployment in Groton sits at 6.8% (2021), which is slightly lower than the region and 1% higher than the state, but average wages are much higher. The professional, scientific, and technical services jobs offered by Pfizer and the well-paying manufacturing and engineering jobs offered by Electric Boat contribute to Groton's $85,097 average wage (2019), $30,000 more than the regional average and $15,000 more than the state average.

Major Trip Generators and Travel Patterns

The US Navy Submarine Base, General Dynamics Electric Boat, and Pfizer are all major destinations within the study area. Groton's means to work modal split echoes the state, with approximately 79% single-occupant vehicle travel. Together, these three work sites account for 19.2% of study area average daily traffic volume. Of the Electric Boat and Pfizer traffic – over 5,000 daily trips – most travelers originate from within the town of Groton, New London, and Montville. Retail nodes within Groton are also travel drivers, though they are not proximal to the Groton Secondary.

Existing Transit Services

SEAT operates local bus service in Groton, including Route 11, which connects Pfizer with Groton Center and overlaps with a section of the Groton Secondary rail line (Figure 7, page 11). Rideshare in Groton also takes the form of vanpools to high-traffic destinations: of the 45 total vanpools in the study area, 29 route to Electric Boat sites in Groton and 8 route to the Groton-New London Airport.

Because Groton is served by a limited public transit network and has major employers with elevated levels of drive-alone commuters, downtown parking availability is an issue. The 2020 City of Groton Parking Management Plan states that there are more than 6,000 parking spaces in downtown Groton. However, after accounting for private lots and the residential parking permit program, this number is closer to 1,500 publicly available spaces. Though Pfizer and Electric Boat operate private garages with over 7,000 dedicated spaces, it is anticipated that hirings in 2022 alone will create a 1,700-parking space deficit based on current modal split, undoubtedly spilling over into downtown spaces. Additional transit service, more aggressive Transportation Demand Management (TDM) policies, the construction of new parking lots, or a combination of these strategies will be needed to address demand.

3. Preliminary Feasibility Assessment

The possible expansion of rail service and infrastructure requires an in-depth assessment of corridor capacity levels and an analysis of the potential impacts of upgrades to existing services. An understanding of the available railroad infrastructure, the condition level to which it is maintained, the installed train control systems, and the current and future services from all operators is required to determine rail line capacity. To establish a sufficient level of capacity for supporting service expansion, features such as operating at passenger service speeds and utilizing Positive Train Control (PTC) and other technology are necessary. PTC systems are required by the Federal Railroad Administration (FRA) and are designed to prevent train-to-train collisions, over-speed derailments, incursions into established work zones, and movements of trains through switches left in the wrong position. The infrastructure needs, corridor capacity evaluations, and possible station locations for passenger rail service along these study corridors are laid out in this section, drawing from data findings detailed in the **Thames River Corridor Assessment (Appendix D)**, **Corridor Capacity Analysis and Service Framework (Appendix E)** and **Potential Station Sites (Appendix F)**.

Northeast Corridor

The NEC segment between New London, CT and Westerly, RI is constructed as a two-track rail system equipped to support Amtrak's active high-speed regional and Acela services. This portion of the Northeast Corridor was electrified in the late 1990s, which allows for the higher speed Acela trains to operate. In 2022 CTDOT began operating its M-8 electric multiple-unit equipment on the SLE. In order to support the projected growth in Amtrak regional and Acela service, as well as the addition of commuter services via the possible SLE extension, findings from the Corridor Capacity Analysis demonstrated an overall need for increased yard space, new stations, and high-level platforms at all stations.

NEC Constraints

- ***Coordinate schedules with movable bridges and other operations***
- ***High-level platforms***
- ***New and alternate station locations***
- ***Yard/storage space***

Infrastructure

The track infrastructure along the NEC is in good condition and all tracks are equipped with Amtrak's Advanced Civil Speed Enforcement System (ACSES) for complete PTC compliance. However, Westerly and Mystic Stations are both only equipped with low-level platforms, which trigger extended dwell times, accessibility challenges for passengers, and incompatibility with the train equipment operated on SLE service (M8 railcars). Constructing high-level platforms would be challenging or impossible due to rail line curvatures at the existing Westerly and Mystic Stations. While New London Center has a high-level platform, it is very short and dwell times are extended.

A lack of equipment storage locations on this line poses an additional constraint to SLE extension operations. Commuter trains cannot be stored at the New London station between assignments, thus generating the need for an alternative storage location – preferably one that a commuter train can access in one continuous operation. In addition, the track configuration at the current Amtrak maintenance yard near the Westerly Station is oriented towards Boston, thus posing a constraint to the commuter service operating in the direction of New London. The yard space could potentially be utilized for overnight equipment storage to support a service extension, providing infrastructure improvements are implemented.

Corridor Capacity

The New London to Westerly section of the NEC is among the slowest due to the significant number of curves. In addition, extending commuter rail service through this portion would involve operating on movable bridges and across grade crossings, which points to the need for coordinated schedules with movable bridge and other overlapping operations. One movable bridge crosses the Thames River and connects the NEC to GWI's Line between Groton and Norwich along the river's east side. The second movable bridge spans the Mystic River before reaching Mystic Station immediately to the east. This existing infrastructure is a key factor in determining the feasibility of new service levels in the corridor.

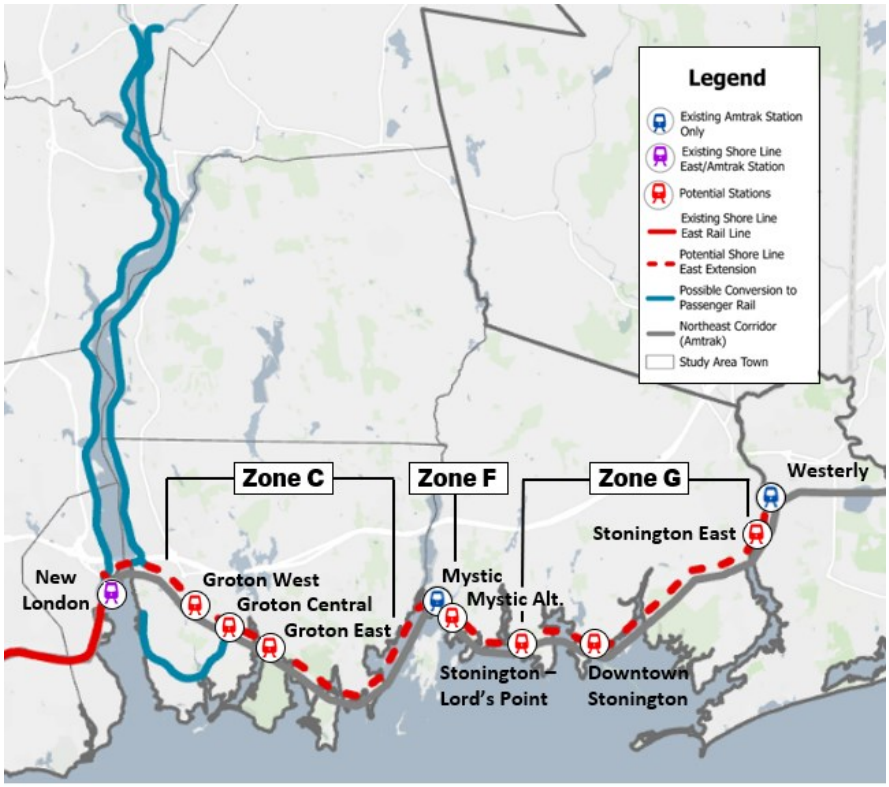
Based on the corridor capacity analysis, which took into consideration existing and planned future Amtrak operations along the line and US Coast Guard movable bridge timing requirements, it was determined that there is capacity for one commuter train per hour in each direction along this segment between New London, CT and Westerly, RI. This means that, when considering passenger rail expansion in this region along all possible alignments, only one train per hour in each direction can cross the Thames River movable bridge.

Possible Station Locations

The identification of potential station sites is a critical aspect of developing routing recommendations for the SLE extension. Within the three station area zones identified along the proposed extension, a total of seven potential station locations were identified, and a high-level assessment of each location was conducted (Figure 8). New London and Westerly were not included in the analysis, as the existing stations in these towns were assumed to provide service for any future system expansion – although further study is needed to assess whether the existing Westerly Station, which is on a curve, could fit a high-level platform. Three station area zones were evaluated for the NEC:

- Station Area Zone C – Groton

Figure 8. Potential SLE Stations



- *Three station locations adjacent to the U.S. Route 1 corridor were considered, with the possibility that a station could be constructed at one of these three locations in the event of SLE extension service implementation.*

- Station Area Zone F – Village of Mystic
  - *One station location was considered as an alternative location to the existing Amtrak station, which is located on a sharp curve and makes operational feasibility difficult.*

- Station Area Zone G – Stonington
  - *Three station locations were assessed to determine the feasibility of a potential new intermediate station in Stonington alongside potential implementation of service extension.*

Assessment findings revealed a range of site constraints, existing connectivity conditions, environmental considerations, market potential, and operational feasibility for each potential station location, which are summarized at the end of the chapter in Table 3.

Thames River Corridor

The Thames River Corridor's Palmer Line and Norwich Branch are constructed as single-track systems that serve as freight railways, hosting 1-2 freight trains per day to meet market demand. Each of these segments of track are each approximately 13.6 miles long. The movable bridge crossing the Thames River, connecting the NEC to the Norwich Branch is the most significant operational challenge along the Corridor.

Necessary Infrastructure Upgrades

- ***Similar levels of repair needed for Palmer Line & Norwich Branch***
  - ***Rail, ties, bridges, grade crossings, PTC & fencing***
- ***Estimated cost: $350-$400M***

Infrastructure

Both the west and east railways running along the Thames River Corridor are in fair to poor condition and would cost roughly $350-$400M to retrofit for passenger rail service, operating as FRA Class 4. A visual inspection and inventory of existing infrastructure was conducted, finding that: the entirety of existing 100/115 pounds per yard steel rail would need to be replaced with heavier duty 132, 133, or 136 pounds per yard steel rail; ties and ballast showed signs of poor drainage and would need to be spot checked and replaced; 23 bridge structures on the Palmer Line and 17 on the Norwich Branch would need to be repaired or replaced; and 18 Palmer Line and 20 Norwich Branch grade crossings would need to be upgraded to rubber panels and have communication equipment installed. Additionally, PTC needs to be installed and Right-of-Way (ROW) fencing needs to be repaired or replaced along both railways.

Corridor Capacity

The findings of the preliminary capacity evaluation indicate that it is feasible for the Palmer Line and Norwich Branch to accommodate passenger rail service if specific infrastructure improvements are made. These improvements include passing sidings for passenger trains at stations, mid-point passing track along the corridor, lead track extensions of industrial sidings, and long lead track or double track approaching the New London Yard port facilities (Palmer Line consideration only). For the Norwich Branch, the biggest constraint is the need to cross the Thames River movable bridge to extend service from New London Station onto the line. Note that, from the NEC Corridor Capacity analysis, there is only capacity for one train per hour in each direction across the Thames River movable bridge, so the one train can *either* operate along the main line (NEC), or it can operate along a Thames River/Groton Secondary branch line, not both.

Possible Station Locations

Two station area zones, including a total of eight possible station locations, were evaluated for the Thames River Corridor (Figure 9):

- Station Area Zone A – Norwich West
  - *Three station locations along the Palmer Line were considered encompassing the totality of the potential western route to Norwich from the existing station in New London, including stations at the US Coast Guard Academy (USCGA)/Connecticut College, Mohegan Sun, and Norwich Transportation Center.*
- Station Area Zone B – Norwich East
  - *Five station locations along the Norwich Branch were considered, spanning the full length of the potential eastern route from Norwich to Groton, including stations in downtown Norwich, Preston, Ledyard, and two at the US Navy Submarine Base.*

Figure 9. Potential Thames River Corridor Stations

The site constraints, existing connectivity conditions, environmental considerations, market potential, and operational feasibility for each potential station location can be found in Table 3 at the end of this chapter.

Groton Secondary

The 2.86-mile spur connecting Electric Boat and Pfizer to the SLE is constructed as a two-track system and would need upgrades to support passenger rail service.

Infrastructure

Like the Thames River Corridor railways, the Groton Secondary infrastructure is in fair to poor condition and needs many of the same upgrades as the Palmer Line or Norwich Branch to be fit for passenger rail service. In addition to steel rail, ties, and ballast replacement, the Groton Secondary has one open deck bridge and seven grade crossings that need to be upgraded to ensure safe operations. The Groton Secondary also needs Positive Train Control (PTC) and ROW fencing along the corridor.

Corridor Capacity

Following the corridor capacity review conducted for the Thames River Corridor, it was determined that passenger rail service is feasible on the Groton Secondary if the following specific interventions occur: complete upgrade of Track 4 from 'Groton' to 'Palmer's Cove', passing siding for passenger or freight trains at Groton Center, and the ability to hold a freight train at Electric Boat without interfering with passenger operations. Note that, from the NEC Corridor Capacity analysis, there is only capacity for one train per hour in each direction across the Thames River movable bridge, so the one train can *either* operate along the main line (NEC), or it can operate along a Thames River/Groton Secondary branch line, not both.

Possible Station Locations

One station area zone was evaluated for the Groton Secondary (Figure 10):

- Station Area Zone D – Groton Secondary
  - *Three stops along the Groton Secondary rail spur were identified: two potential station options for the terminus of the service in proximity to the Electric Boat complex, as well as an intermediate stop at the Groton-New London Airport.*

Figure 10. Potential Groton Secondary Station Locations

Table 3. Station Location Considerations

Potential Station Location	Zone	Regulatory					Site Constraints			Environmental Considerations			Connectivity			Market Potential	Operational Feasibility
		Existing Land Use	Surrounding Land Uses	Zoning	Environmental Justice	Distressed Muni.	Parcel Ownership	ROW Constraints	Topography Constraints	Wetlands	Flood Plain	Sea Level Rise	Bus Routes/Stops	Trails/ Greenways	Bicycle Infrastructure		
Norwich West	A-1	Vacant	Commercial Institutional	General Commercial	None Present	2021	Public	Moderate	Moderate	Estuarine/Marine Deepwater	100-Year Flood	N/A	Several SEAT Routes	Two proximate greenways	None Present	Moderate Potential	Moderate Challenges
Montville	A-2	Vacant	Commercial; Parking	Commercial	None Present	2021	Public	Minimal	Moderate	None	Minimal	N/A	SEAT Routes 1 & 7	None Present	None Present	Significant Potential	Minimal Challenges
USGA Academy Conn. College	A-3	Parking	Coast Guard Academy	Institutional	None Present	2021	Public	Minimal	Minimal	None	100-Year Flood	N/A	SEAT Route 1	None Present	None Present	Moderate Potential	Minimal Challenges
Downtown Norwich	B-1	Commercial	Commercial	Central Commercial	None Present	2021	Private	None	None	None	500-Year Flood	N/A	SEAT Routes 4, 7, & 982	None Present	None Present, Future Opp.	Strong Potential	Minimal Challenges
Preston	B-2	Vacant	Vacant (Planned Dev.)	Development District	EJ Community	2020	Public	Minimal	Minimal	Freshwater Emergent Wetland	Minimal	N/A	SEAT Route 2	None Present	None	Significant Potential	Minimal Challenges
Ledyard	B-3	Vacant	Residential	Residential	None Present	N/A	Public	Moderate	Minimal	None	Minimal	N/A	SEAT Route 2	None Present	None Present	Limited Potential	Minimal Challenges
Groton West	C-1	Car Wash	Commercial Manufacturing	Neighborhood Commercial	None Present	2021	Private	Minimal	Moderate	None Present	500-Year Flood	N/A	SEAT Routes 11, 108	None Present	None Present	Significant Potential	Minimal Challenges
Groton Central	C-2	Vacant	Nursing Home, Residential	Mixed-Use Village Center	None Present	2021	Public	Minimal	Minimal	Freshwater Forested/Shrub	Zone AE (EL10)	Proximate to Low-Lying Area	SEAT Routes 11, 108	None Present	None Present	Moderate Potential	Minimal Challenges
Groton East	C-3	Vacant	Residential Amtrak	General Industrial	None Present	2021	Public	Moderate	Minimal	None	None	N/A	SEAT Routes 11, 108	None Present	Existing sidewalks	Moderate Potential	Minimal Challenges
Electric Boat West	D-1	Vacant	Parking, Residential, Fuel Storage, Industrial	Information/Technology	None Present	2021	Private	Moderate	Minimal	None	None	N/A	None Present	None Present	Minimal	Significant Potential	Moderate Challenges
Electric Boat East	D-2	R&D Facility	Research and Development Campus, Institutional and Industrial Uses	Information/Technology Technology Campus	None Present	2021	Private	Significant	Minimal	None	None	N/A	None Present	None Present	Existing sidewalks	Moderate Potential	Moderate Challenges
Groton-New London Airport	D-3	Vacant	General Industrial	Residential Airport	None Present	2021	Public	Moderate	Minimal	Freshwater Forested/Shrub	100-Year Flood	N/A	None Present	None Present	None Present	Significant Potential	Minimal Challenges
Groton Sub Base North	E-1	Parking	Rural Residential	Naval Base	None Present	2021	Public	Moderate	None	None	100-Year & 500-Year Flood	N/A	SEAT Route 2	None Present	Nearby Shared Use Path	Moderate Potential	Minimal Challenges
Groton Sub Base South	E-2	Vacant	Residential Single-Unit	Residential Naval Base	None Present	2021	Private	Moderate	Significant	None	100-Year Flood	N/A	SEAT Route 2	None Present	None Present	Limited Potential	Minimal Challenges
Mystic Alternative	F-1	Antique Store	Shopping, General Commercial, Residential, Manufacturing	General Commercial	None Present	Not Designated	Private	Moderate	Moderate	Freshwater Emergent Wetland	500-Year Flood	N/A	SEAT HOP Service	None Present	None Present	Moderate Potential	Minimal Challenges
Stonington Borough	G-1	Community Center	Marine Commercial, Moderate Residential	Development Area	None Present	Not Designated	Public	Moderate	Moderate	None Present	100-Year Flood	Proximate Low-Lying Area	SEAT HOP Service	None Present	None Present, Future Potential	Moderate Potential	Minimal Challenges
Lords Point	G-2	Nuclear Engineering	Residential, Manufacturing	Coastal Residential & Manufacturing	None Present	Not Designated	Private	Moderate	Moderate	Estuarine and Marine Wetland	100-Year Flood	Proximate to Low-Lying Area	SEAT HOP Service	None Present	None Present	Limited Potential	Minimal Challenges
Stonington East	G-3	Municipal Open Space	School, Community, Recreation, Manufacturing, Residential	Rural Residential	None Present	Not Designated	Public	Moderate	Minimal	Freshwater Forested/Shrub Wetland	500-Year Flood	N/A	SEAT HOP Service	None Present	None Present, Future Potential	Limited Potential	Minimal Challenges

4. Transit Market

Figure 11. Public Meeting in Groton

The feasibility study's in-depth evaluation of existing conditions in the study area was accompanied by public engagement efforts to solicit feedback from communities and stakeholders, and to maintain transparency between the study team and these groups. With the understanding that the expansion of passenger rail service would serve an array of municipalities and associated local communities, the study team established a Steering Committee and Working Groups and conducted Public Information Meetings as well as a public survey to ensure inclusive engagement with the transit markets in the study area (Figure 11). An engagement summary is maintained as a living document on the project website[6]. The region-wide and corridor specific transit markets are described in this section.

Region-wide

Projections indicate slow overall population growth in the state and region in the future; southeastern Connecticut population is projected to increase by two percent between 2025 and 2040[7]. Projected population change in specific locations may differ from actual future changes depending on the land available for development, but Norwich and Montville are projected to see greater population increases relative to the rest of the region due to greater birth and in-migration rates. Additionally, there is a significant aging population anticipated throughout the region – in part due to individuals not wanting to relocate post-retirement – resulting in about a third of the population over the age of 65. This aging population points to a future high demand for a variety of accessibility features including accessible and safe transportation opportunities.

Regional Transit Market

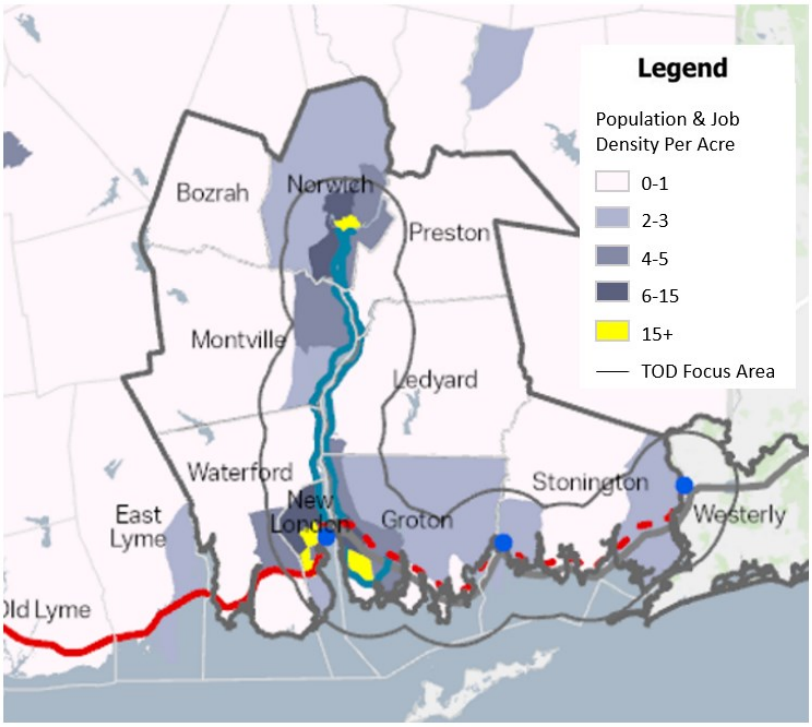
- ***Most densely populated: New London, downtown Norwich, eastern Groton, Mystic, Pawcatuck/Westerly downtown***
- ***Projected aging population***
- ***Projected increase in jobs; booming manufacturing industry***
- ***Communities vulnerable to change***

The number of jobs has declined in the pre-pandemic decade. The region has relied heavily on the gaming and service industries for job opportunities, which have both been severely impacted since the recession in 2008 and more recently by the Covid-19 pandemic. However, the ongoing pandemic has made prior projections around the labor market less clear in their certainty – the unemployment rate continues to fall in the region, and the manufacturing industry is anticipated to grow rapidly in the next decade. General Dynamics Electric Boat hired

[6] Connecticut Department of Transportation. Eastern Connecticut Corridor Rail and Transit Feasibility Study. https://portal.ct.gov/Eastern-CT-Rail
[7] Connecticut State Data Center, 2015-2040 Population Projections by Town, 2021. https://data.ct.gov/Government/2015-2040-Population-Projections-Town-Level/p6hp-fnp7

thousands of new employees in 2022 and is expected to bring a considerable number of jobs to the region to meet the needs of new military contracts.

Figure 12. Density to Support Transit Ridership and Sustain TOD



The TOD Corridor Scan analyzed the existing conditions specific to the communities surrounding the proposed rail line extensions (Figure 12). It revealed relatively low population and job densities along the corridors with the greater population density in urban cores. These urban cores – particularly New London, Norwich, and Groton – would likely support the most transit ridership and could potentially sustain TOD. However, supportive land use policies and local infrastructure investments throughout corridor-abutting communities will be critical to connecting the current populations to the rail stations, encouraging higher density development, and subsequently building the market for TOD.

Northeast Corridor

Along this section of the NEC, the areas with the highest population and employment densities are around the urban cores of New London, Groton, and Westerly. Stonington represents the least densely populated portion of the corridor and has the lowest employment densities of the four towns.

There are three major employers proximate to the SLE extension: Lawrence Memorial Hospital in New London and Electric Boat Corporation and Pfizer in Groton, which are the first, third, and fourth largest employers in the study area, respectively. A projected increase in employment rates, particularly with Electric Boat's hiring spike in 2022, represent a critical opportunity for this corridor in terms of supporting and developing TOD. In addition, with the Amtrak infrastructure and service already in place, the extended SLE service would support connections between corridor-abutting communities, to the region's major employers, and to major tourist destinations like New London and Mystic.

Northeast Corridor Opportunities

- ***Existing Amtrak Service***
- ***Major Employers***
  - ***Lawrence Mem. Hospital***
  - ***Electric Boat Corp.***
  - ***Pfizer***
- ***Major Tourist Destinations***
  - ***New London***
  - ***Mystic***

Thames River Corridor

New London, Groton, and Norwich are economic hubs within the eastern Connecticut region that are presently connected through disjointed transportation systems, including infrequent bus service, freight railways, and

limited bicycle and pedestrian infrastructure. When surveyed as part of this study, 94% of respondents said that they would support passenger rail from Norwich to New London, with 59% reporting they would use the service occasionally to regularly (**Public Survey Report (Appendix G)**). This underpins key findings from previous planning documents, calling for increased regional connectivity between existing population and employment centers.

Communities along the Palmer Line, running from New London through Waterford and Montville to Norwich, have a higher average population and job density than municipalities abutting the Norwich Branch, suggesting that passenger rail service on the western banks of the Thames would capture a greater ridership share than service on the east. This service would also connect Montville's Mohegan Sun, which is responsible for the highest percentage of vehicular traffic within the region and the two highest-ridership SEAT routes. The line could also serve other destinations, including Connecticut College and the US Coast Guard Academy. Each of the towns with potential stations along the route have identified in their POCD the importance of and plans to improve multimodal access, including enhanced and expanded bicycle and pedestrian infrastructure and improving the usability of expanded transit service. Similarly, Montville, New London, and Norwich plan to increase infill development and have a large percentage of connected sewer service areas to support this expansion. Prioritizing passenger rail service along the Palmer Line is congruent with the SEAT Bus Study, SCCOG Long Range Metropolitan Transportation Plan, and SCCOG POCD, which set the goal of express bus service or light Bus Rapid Transit from New London to Norwich to capitalize on travel patterns and improve regional connectivity.

Adding passenger rail service on the Norwich Brand could provide service to the US Navy Base, the planned Preston Riverwalk Development, and downtown Norwich. The two-mile radius around the Norwich Branch experienced a 1.5% job increase between 2010 and 2019. However, Preston and Ledyard each have a density of 0-1 people and jobs per acre, and virtually no sewer infrastructure to support infill development surrounding the Norwich Branch.

Groton Secondary

The region of Groton where Electric Boat and Pfizer are located creates a market for transit; not only do these industries provide high-wage jobs that pull in commuters to Groton, but the companies also plan to grow their respective workforces in a downtown setting with limited parking options. Also within this region of Groton, though not directly adjacent to the train tracks, are the Avery Point Campus of the University of Connecticut, the Connecticut National Guard Readiness Center, and the Groton-New London Airport. In addition to these activity centers, the tracts are densely populated. This region of Groton has a disproportionately high percentage of renters: up to 85%, as compared to 40% rental rate in the study area and 34% statewide. Over 2,500 of these renters are cost-burdened, meaning that they apportion more than 30% of their income to rent. Transit solutions in this area could serve both residents and employers.

5. Assessment Outcomes

While all the alignments analyzed during the preliminary feasibility assessment were determined to be technically feasible, the remainder of the phases of the ECRTS will focus detailed analysis on one alignment in each corridor. The movable bridge over the Thames River was determined to be a key constraint in screening the alignments. The Corridor Capacity Analysis determined that only one train per hour in each direction can operate east of New London Station across the Thames River movable bridge. The movable bridge constraint means that in order for a passenger rail alignment option to move forward in each corridor (Thames River and NEC), the only solution is the NEC/SLE extension on the main line and the Palmer Line on the west side of the Thames River. Consideration of operations on either the Norwich Branch or the Groton Secondary on the east side of the Thames River would eliminate the possibility of SLE extension along the mainline.

So, for the purposes of this study, due to operational feasibility, security constraints, and the market for passenger rail service, the remainder of the phases of the ECRTS will be focused on studying in more detail the feasibility of:

- Shore Line East extension from New London, CT to Westerly, RI
- Palmer Line (West) Thames River Corridor Passenger Rail Service (Phased Approach)
- Improved and expanded local and regional transit service across the region

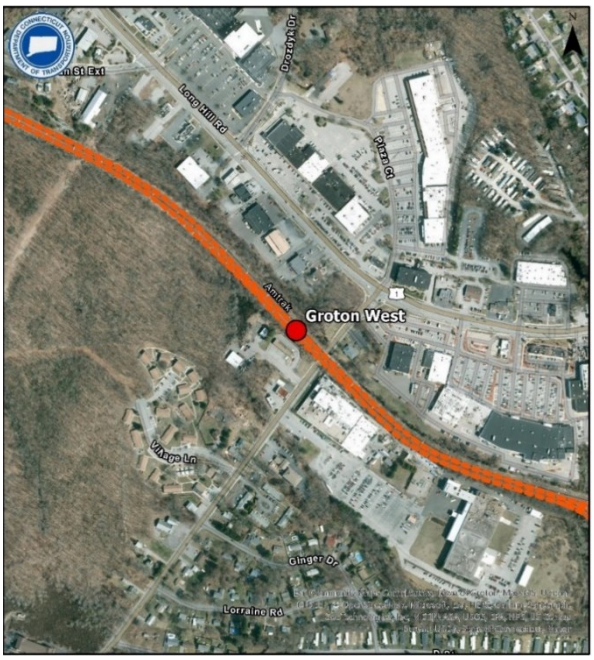
Additional development of transit service options to make meaningful and frequent regional and local connections will also play a major role in the remainder of the phases of the ECRTS, especially where the market for transit was shown to be strong, but not yet rising to the level appropriate for investment in rail.

Shore Line East Extension to Westerly, Rhode Island

The SLE extension would establish commuter rail service between New London and Westerly. The portion of the NEC between New London and Westerly is characterized by a considerable number of curves along the route, two movable bridges, and a number of grade crossings, all of which limit the speed of rail service. There are significant service constraints involved in operating on movable bridges due to the time consumed when a bridge is closed to rail traffic. The alternative, however, of rebuilding a bridge to be at a height where river traffic could pass underneath is a highly expensive undertaking. Ensuring that additional service levels coordinate with movable bridge operations is more feasible.

A specialized Corridor Capacity Analysis (Appendix E) evaluating the feasibility of different service levels in relation to movable bridge operations determined that the SLE extension to Westerly could operate one commuter train per hour in each direction, which also factors Amtrak's increased traffic resulting from its planned service increase.

Figure 13. Groton West Station Location



The analysis of potential station locations within each station area zone and input from Amtrak identified the following locations as most feasible:

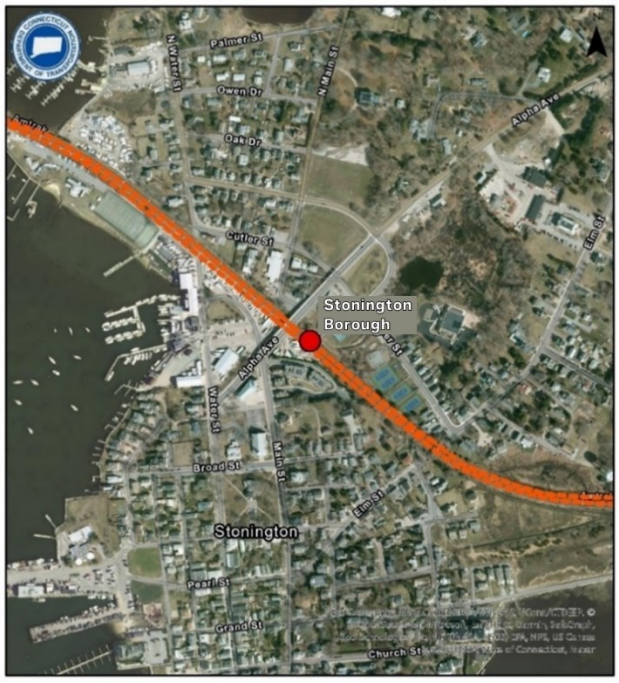
- Groton West (Figure 13)
  - *Despite the possible challenge with regards to the grade change between the rail and the site at this location, Groton West would likely not require track reconfiguration and is the most feasible station option. Groton East would require significant coordination with Amtrak, Groton Central appears to have less ridership demand than the alternatives, and both East and Central locations would require the sidetrack infrastructure to be reconfigured.*
- Mystic Alternative
  - *The current Mystic Station cannot accommodate high-level platforms due to the station's position on a curve. The electric M8 equipment used on SLE and Americans with Disabilities Act (ADA) level-boarding regulations require a high-level platform. The existing Mystic Station is exempt from the level-boarding requirement because it is grandfathered; it was constructed before ADA regulations*

were introduced. Any station alterations, such as the required grade crossing (safety) upgrades at the station, would trigger current ADA compliance regulations, including the requirement of level-boarding. The Mystic Alternative, located on a straighter section of track, would improve operational efficiency and access to nearby amenities while maintaining regional connections via U.S. Route 1. Possible constraints would be the need for significant coordination with Amtrak due to the existing Mystic Station used a few times a day, as well as the potential change in ridership demand at the alternate location and the need for transit or shuttle connections, but the Mystic Alternative is the most viable station option for this zone.

- Stonington Borough (Figure 14)
  - *All three Stonington location options are feasible, however limited ridership demand for Lords Point and Stonington East give the Stonington Borough location the greatest value in terms of market opportunity and ridership demand. The Borough location is also walkable to Stonington's downtown area, thus supporting TOD and transit access to major trip generators.*

As previously noted, the exclusive use of high-level platforms supports accessibility and safety particularly for seniors and individuals with disabilities, and it supports operational efficiency by reducing boarding and alighting times. With the existing Westerly station situated on a curve, further study is needed to determine the feasibility of a high-level platform at this location.

Figure 14. Stonington Borough Location



In addition to considering the service, station locations, and equipment factors, yard and storage space is necessary to the successful implementation extended SLE service. Current barriers include the lack of storage space for commuter trains at the New London Station and the need for a commuter train storage and turnaround space off the main track in Westerly. Further study is thus needed to determine an alternative accessible storage location in New London, as well as whether a track reconfiguration at the current Amtrak maintenance yard to make commuter train turnaround in the direction of New London is possible. Provided such improvements could be implemented, the Westerly yard space could be utilized for overnight equipment storage.

Thames River Corridor

Phasing transit improvements along the Thames River Corridor will allow those traveling between regional economic nodes to experience greater mobility more immediately, while larger capital investments become operational over a longer time horizon. Two key phases were identified following evaluation of existing conditions and potential alternatives to improve transit and rail service and connectivity.

The first phase towards increasing inter-municipal mobility is expanding and enhancing the bus service:

- Improving regional bus service from New London to Norwich has been identified as a priority in numerous statewide, regional, and local plans; improving the operational hours, increasing frequency, and adopting a single fare collection system will heighten the usability and convenience of service for travelers commuting between the two nodes and beyond.

- Developing frequent, reliable regional bus service from Groton or New London to Hartford will tap into greater ridership numbers, as Hartford is the second most frequent commuter destination outside the study area.
- Enhancing local bus service for travelers throughout the region by displaying real-time travel information, improving bus shelters and signage, expanding operational hours, decreasing headways, adopting a single fare collection system, and improving multi-modal connections to prominent stops.
- Establishing a frequent route between the US Navy Submarine Base and Electric Boat's Groton facilities leverages existing roadways to provide expedient service between the two employers.
- Expanding other major employer bus service to cover a larger area of park and ride stops, more residential nodes, and encouraging TDM policies that incentivize employees to utilize this service will aid in alleviating the discrepancy in downtown Groton's available parking supply as these employers continue to grow.

Palmer Line Advantages

- ***Mohegan Sun is the largest regional trip generator***
- ***Infill development is supported by existing sewer infrastructure***
- ***Does not have to cross a moveable bridge (costly & passenger delay)***
- ***Does not have to address security concerns associated with US Navy Submarine Base, though it will require security coordination with the USCGA***

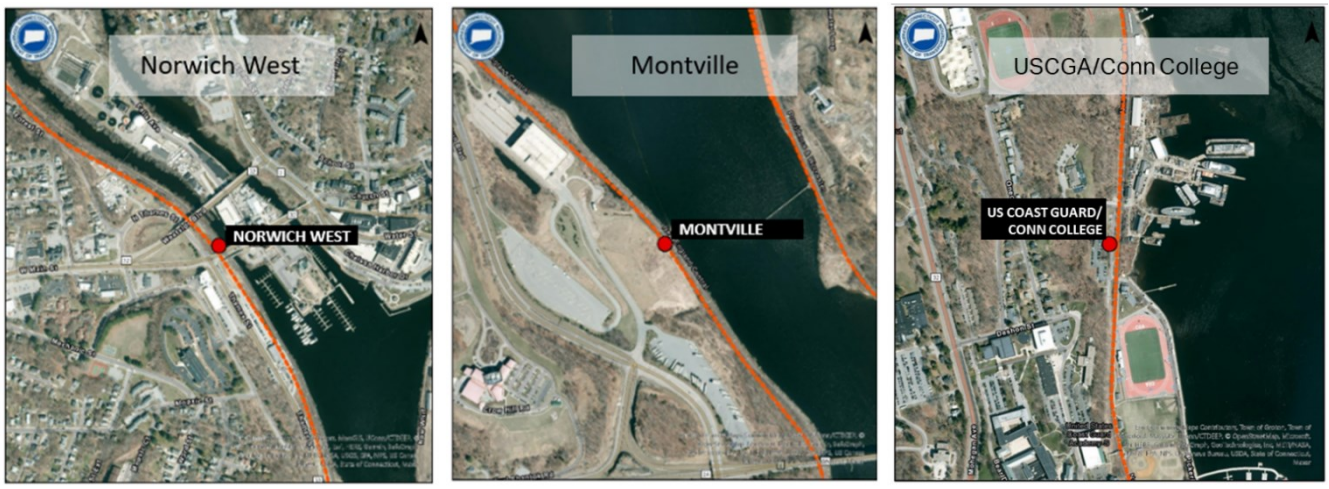
The second phase in improving regional connectivity is upgrading the Palmer Line to establish passenger rail service between New London and Norwich, including stops at the US Coast Guard Academy/Connecticut College, Mohegan Sun, and Norwich Transportation Center. In addition to citing infill development as a near-term goal in local planning documents, the towns of New London, Montville, and Norwich have more widespread sewer connections than their eastern neighbors, indicating that the parcels along the Palmer Line are primed for development. Each of the three proposed stations have unique development opportunities that warrant further investigation:

- The Norwich Transportation Center would provide convenient access to other transportation options and serve as a major regional transit hub.

- Mohegan Sun in Montville has significant market opportunity. This station could attract new visitors and spur business expansion, growing the economic impact of the Casino and expediting infill development.

- US Coast Guard Academy/Connecticut College located in New London could provide students, faculty, and staff with alternative methods of transportation when traveling to and from their respective campuses, as both are within a quarter mile from the proposed station site. This site will require coordination with the USGCA to address security, public access, parking or other concerns.

Figure 15. Palmer Line Stations



The Palmer Line also faces fewer operational constraints than the Norwich Branch. Any proposed service east of the Thames River requires major coordination with Amtrak for operating the moveable bridge, which would cause passenger delay in addition to incurring additional operational costs. Service along the Norwich Branch would also require extensive collaboration with the US Navy through the submarine base stop(s). Any time a VIP were to visit the base or there was a security risk, all trains would need to be halted, disrupting regularly scheduled passenger service.

Groton Secondary

The Groton Secondary offers an opportunity to serve employees at Electric Boat and Pfizer and cost-burdened renters living adjacent to the railway and create multimodal connections to the Groton-New London Regional Airport. However, the proposed service is inefficient compared to other modes. The geometric alignment of the track presents three operational challenges: curvature on the existing track reduces the overall speed that passenger service could operate, the spur's connection to the Thames River Corridor at New London Station requires additional use of the movable bridge over the Thames River, to the detriment of the expanded SLE corridor service, and spatial constraints create challenges for turning trains. From a passenger's perspective, the route is largely inefficient given the most anticipated travel scenarios: commuting from the Electric Boat complex in Groton to the New London Station or to the US Navy Submarine base. In the former, a traveler could more easily access New London via ferry service across the Thames or access mainline SLE passenger rail service via the potential Groton West Station, rather than relying on the Groton Secondary's meandering route. In the latter, existing roadways connect the two job centers; a more efficient use of resources would be to run a shuttle bus from one site to the other. Additionally, the residential tracts abutting the Groton Secondary and access to the airport could be served by the potential Groton West Station on the NEC. Improving bicycle and pedestrian infrastructure surrounding the potential Groton West Station would improve access for residents living nearby, whereas a 3-mile loop shuttle bus route could connect the airport via Poquonnock and High Rock Roads. For these reasons, the Groton Secondary will not be given further consideration for potential passenger rail service.

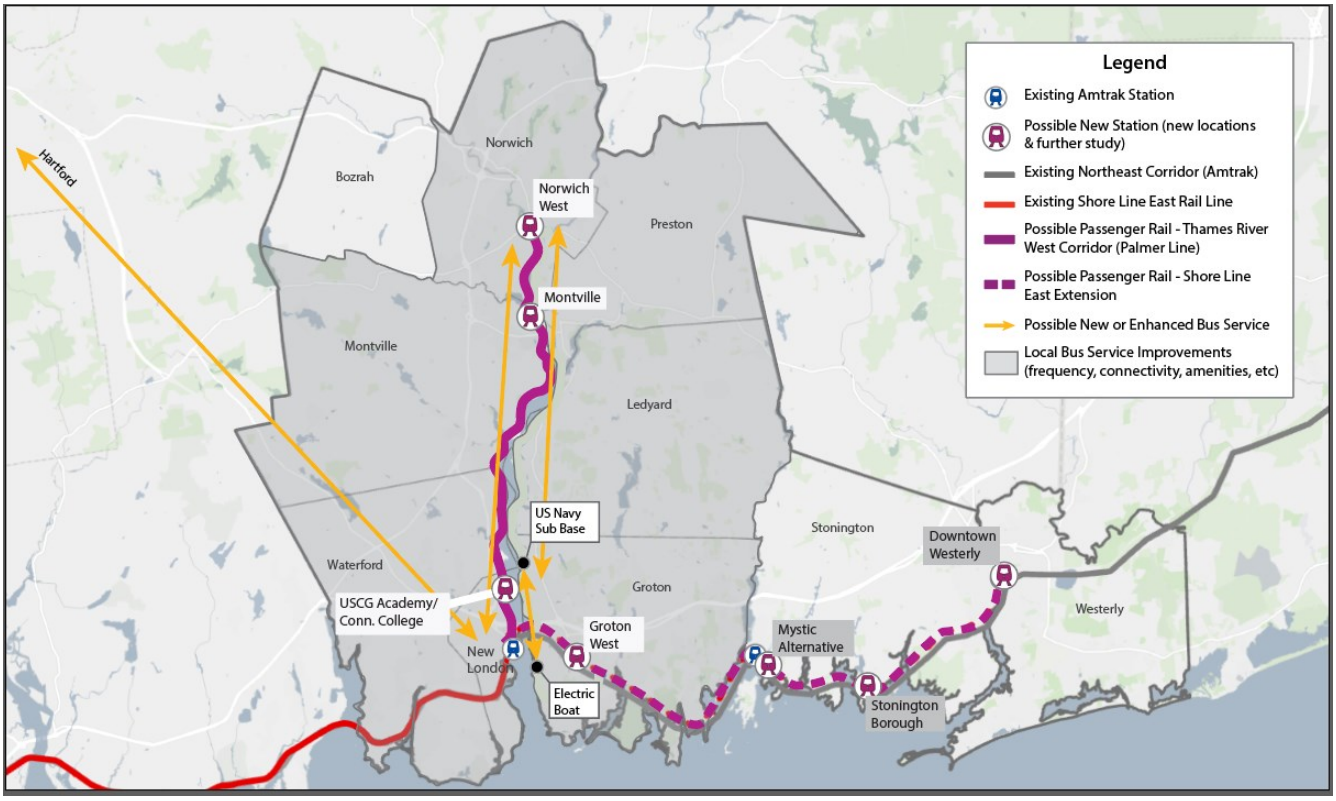
Groton Secondary ***Disadvantages***
• ***Curved track geometry results in slower travel times than other modes***
• ***Coordination for movable bridge is costly and could result in passenger delays***
• ***New London Station does not have space for turning trains***

6. Study Next Steps

Following completion of this preliminary feasibility assessment, ECRTS will proceed with more detailed analysis along the refined corridors and station locations (Figure 16):

- Shore Line East extension from New London, CT to Westerly, RI
    - New London (existing station)
    - Groton West (new)
    - Mystic Alternative (new)
    - Stonington Borough (new)
    - Westerly (existing station with low-level platform; curvature, operating agreement, future plan challenges to be investigated further)
- Thames River Corridor from New London to Norwich
    - Bus Service Enhancements (shorter term)
        - Develop transit plan and consider:
            - New and enhanced local and regional services
            - Connection to possible new rail stations
    - Palmer Line (West) Thames River Corridor Passenger Rail Service (longer term, phased approach)
        - USCGA/Connecticut College (new)
        - Montville/Mohegan Sun (new)
        - Norwich West/Norwich Intermodal Center (new)
- Transit and bicycle/pedestrian solutions across the region

Figure 16. Summary of Corridor and Station Refinements



The more detailed analysis on the refined locations includes the following:

- Finalization of conceptual alignments and station locations
- TOD market assessment of station locations, including consideration of zoning and land use policies
- Transit plan, including level of service, ridership trends, access, and infrastructure needs
- Rail service plan, based on corridor capacity analysis
- Identification of more detailed equipment and system requirements and needs
- Ridership, revenue, and Greenhouse Gas (GHG) reduction projections for rail and transit services
- Capital costs for rail lines, stations, yard space, infrastructure, fleet, technology, etc.
- Capital costs for enhanced transit infrastructure, bus stops, fleet, technology, etc.
- Operating costs for rail and transit services
- Development of a final report with a path forward

The next steps also include additional stakeholder and public engagement:

- Interviews with major employers and anchor institutions
- Municipal and Transit Working Group Meetings
- Steering Committee Meeting
- Public Meetings/Public Comment Period